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10/732,807	12/11/2003	Shunpei Yamazaki	12732-187001 / US6799/685	5890
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FISH & RICHARDSON P.C. P.O. BOX 1022 MINNEAPOLIS, MN 55440-1022			YAMNITZKY, MARIE ROSE	
			ART UNIT	PAPER NUMBER
			1794	
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary****Application No.**

10/732,807

**Applicant(s)**

YAMAZAKI, SHUNPEI

**Examiner**

Marie R. Yamnitzky

**Art Unit**

1794

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 December 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1 and 27-55 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 27-55 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-850)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Inventor's Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date See Continuation Sheet

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :  
11 Dec 2003, 22 Mar 2004, 26 Apr 2004, 28 Jun 2004 and 27 Aug 2004.

1. This Office action is in response to applicant's amendment and election filed December 21, 2007. The amendment filed December 21, 2007 amends claim 1, cancels claims 2-26 and adds claims 27-55. Claims 1 and 27-55 are pending.

Applicant's election without traverse of Group I in the reply filed on December 21, 2007 is acknowledged. Claims 1 and 27-55 read on the elected invention.

2. Claims 27, 28, 33, 34, 39, 40, 45, 46, 51 and 52 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Support for the subject matter of present claims 27, 28, 33, 34, 39, 40, 45, 46, 51 and 52, particularly for the definition of  $x$  as a natural number, is not clear.

$\text{SiH}_x$  only appears in the original disclosure at page 5 (first full paragraph), p. 19 (full paragraph) and p. 27 (last full paragraph), with no accompanying definition of  $x$ .  $\text{SiO}_x$  only appears in the original disclosure at page 4 (last full paragraph) and p. 19 (full paragraph), with no accompanying definition of  $x$ .

3. Claims 1 and 27-55 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The present claims require that the EL layer include silicon “with  $1 \times 10^{18}$ - $5 \times 10^{20}$  pieces/cm<sup>3</sup> by SIMS measurement.” The specification contains the same language. It is not clear what is meant by “pieces”. It is not clear if “pieces” are discrete atoms of silicon, or discrete molecules of a compound comprising silicon, or if “pieces” are particles comprising silicon wherein each particle may be made of multiple atoms or molecules.

It is also not clear if “pieces/cm<sup>-3</sup>” is correct. If the SIMS measurement provides a measure of the number of pieces per cubic centimeter, then “pieces/cm<sup>-3</sup>” should instead read either “pieces·cm<sup>-3</sup>” or “pieces/cm<sup>3</sup>”.

Proper antecedent basis is lacking for “the organic compound” as recited in claim 54. Claim 50, from which claim 54 depends, requires a “first compound” and a “second organic compound”. It is not clear if “the organic compound” of claim 54 refers to the “second organic compound” of claim 50, or if the “first compound” of claim 50 could also be organic and be further defined by claim 54.

The present independent claims require an organic compound “in which electroluminescence is obtained”. The examiner would ordinarily interpret this language as requiring the organic compound to be light emissive. However, it is not clear if this interpretation is correct given dependent claims 30, 36, 42, 48 and 54, which set forth a Markush group of four compounds from which the organic compound is selected, with only one of the compounds being within the scope of compounds disclosed in the specification as compounds which present light emission. Of the other three compounds included in the Markush group of the dependent claims, two are amine compounds, which are disclosed in the specification as compounds in which hole

transport performance is high, and one is a phenanthroline derivative (basocuproine), which is disclosed in the specification as a compound in which electron transport property is high. (For example, see page 10, lines 9-25 of the specification.)

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(c) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1 and 27-55 are rejected under 35 U.S.C. 102(a) or 102(c) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Yamazaki et al. (US 2003/0124764 A1).

See the entire published application. In particular, see paragraphs [0007]-[0013], [0027]-[0031], [0326]-[0331] and [0336]-[0340].

Yamazaki et al. explicitly teach all of the limitations of the present claims with the exception of the concentration limitation of the silicon as set forth in the present independent claims. However, in paragraph [0336], Yamazaki et al. teach a concentration of “0.01 atoms % to 5 atoms %, preferably 0.1 atoms % to 2 atoms %.” These same concentration ranges are taught in the paragraph bridging pages 23 and 24 of the present specification. Presuming for the sake of argument that these atomic % ranges provide the pieces/cm<sup>-3</sup> ranges set forth in the present independent claims, Yamazaki et al. anticipate the present claims.

In the alternative, if the atomic % ranges set forth in the paragraph bridging pages 23 and 24 of the present specification do not necessarily provide a silicon concentration in the range of  $1 \times 10^{18}$ - $5 \times 10^{20}$  pieces/cm<sup>-3</sup> by SIMS measurement as required by the present claims, it is the examiner's position that, absent a showing of criticality for the presently claimed range, it would have been within the level of ordinary skill of a worker in the art at the time of the invention to determine suitable and optimum concentrations of silicon to be included in the organic layer. One of ordinary skill in the art at the time of the invention would have been guided in the determination of suitable and optimum concentrations of silicon to be included in the organic layer by Yamazaki's teachings.

7. Claims 1, 28-32, 34-38, 40-44, 46-50 and 52-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over King et al. (US 2005/0029931 A1).

See the entire published application. In particular, see paragraphs [0001]-[0004], [0007], [0017]-[0019], [0025]-[0029], [0032]-[0043], [0054] and [0055].

King et al. teach the use of particles of silica, colloidal silica or borosilicate glass to stabilize organic materials used as electroluminescent materials in an organic light emitting diode. King teaches concentration ranges for the particles in terms of mg/ml. King does not teach a concentration range in terms of pieces/cm<sup>3</sup> by SIMS measurement as recited in the present independent claims. Absent a showing of criticality for the presently claimed range, it is the examiner's position that it would have been within the level of ordinary skill of a worker in the art at the time of the invention to determine suitable and optimum concentrations of silicon to be included in the form of particles of silica, colloidal silica or borosilicate in the organic layer. One of ordinary skill in the art would have been motivated to optimize the concentration of particles in order to optimize photostability such as taught in paragraph [0077]. One of ordinary skill in the art would have been motivated to utilize a sufficient concentration of particles so as to achieve photostability, while avoiding the use of an excess concentration of particles from which no further increase in photostability would be obtained.

King's disclosure of silica and colloidal silica meet the requirement for silicon included as SiO<sub>x</sub> wherein x is a natural number as required by present claim 28 and similar claims.

King teaches luminescent materials that provide fluorescence as required by present claim 29 and similar claims (e.g. Alq3, PPV and polyfluorenes as taught in paragraphs [0039]-[0040] are known fluorescent materials).



The last member of the Markush group in present claim 30 and similar claims is taught by King et al. (Alq3). In paragraph [0039], King also teaches that it is known to blend with a charge transporting matrix. The two amine compounds that are named in present claim 30 and similar claims are well-known in the art as charge transporting compounds. It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to carry out King's invention using organic materials known in the art.

With respect to the requirement for a thin film transistor as in present claim 31 and similar claims, the incorporation of a thin film transistor as part of the electrical driving system of a light emitting apparatus was known in the art at the time of the invention. It would have been an obvious modification to one of ordinary skill in the art at the time of the invention to incorporate known electrical driving components into a device having the improved photostability taught by King et al.

With respect to the requirement of present claim 32 and dependents for a host material and a dopant material, King teaches that it is known to use a combination of materials as taught, for example, in paragraph [0039].

With respect to the multi-layer/multi-region device structure of present claims 32, 38, 44 and 50, and claims dependent therefrom, King teaches in paragraph [0035] that multiple organic layers are often used, and the general device structure set forth in these claims was known in the art at the time of the invention. It would have been within the level of ordinary skill of a worker in the art at the time of the invention to carry out King's invention to make EL devices having multi-layer/multi-region device structures that were known in the art at the time of the invention.

8. Claims 1, 27, 29-33 and 35-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 09-328680.

An English language abstract for this reference was provided by applicant. A machine-assisted translation of the reference is provided with this Office action.

The prior art teaches an organic EL device in which inorganic substance particles are combined with an organic luminous agent to provide an organic substance layer (e.g. see the abstract and the drawing). The inorganic substance particles may comprise silicon as taught, for example, in paragraphs [0009] and [0012]. The prior art does not place a particular limit on the concentration of inorganic substance particles to be combined with the organic luminous agent. Absent a showing of criticality for the presently claimed range for the concentration of silicon as set forth in the present independent claims, it is the examiner's position that it would have been within the level of ordinary skill of a worker in the art at the time of the invention to determine suitable and optimum concentrations of silicon to be included in the form of particles in the organic layer of the prior art EL device in order to provide a functional device.

The prior art disclosure of hydrogenation amorphous silicon meets the requirement for silicon included as  $\text{SiH}_x$  wherein  $x$  is a natural number as required by present claims 27 and 33.

Regarding present claims 29, 30, 35 and 36, the prior art does not specifically limit the organic luminous agent that may be used in the invention, and provides examples in which coumarin, which is a fluorescent compound, is utilized as the luminous agent. The prior art does not explicitly disclose any of the materials named in claims 30 and 36, but the last material named in these claims was well-known in the art at the time of the invention as a luminous/

fluorescent agent. It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to carry out the prior art invention using organic luminous agents known in the art.

With respect to the requirement for a thin film transistor as in present claims 31 and 37, the incorporation of a thin film transistor as part of the electrical driving system of a light emitting apparatus was known in the art at the time of the invention. It would have been an obvious modification to one of ordinary skill in the art at the time of the invention to incorporate known electrical driving components into a device having the organic substance layer taught by the prior art.

9. Miscellaneous:

In line 3 of claims 30, 36, 42, 48 and 54, "metylphenyl" should read --methylphenyl--.

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Tokito et al. (US 5,783,292) disclose an EL device in which an organic material and an inorganic material are used in combination to form a mixed thin film. Organic materials within the scope of those set forth in present claim 30 are disclosed (e.g. see col. 8, lines 50-65), and the inorganic material may be silicon oxide (e.g. see c. 8, l. 66). Tokito teaches that the combination provides thermal stability and prevents formation of pinholes. Tokito differs from the proposed invention of the present claims in that in the mixed thin film of Tokito's invention, the organic

material is uniformly dispersed in the inorganic material. Tokito also teaches a concentration of organic material in the range of 10 to 50 vol% with respect to the total volume of the mixed thin film. While the concentration limitation by SIMS measurement as set forth in the present claims is not clear, it appears from the present specification that the presently recited range provides a relatively low concentration of silicon in the layer such that the resulting layer does not have the same structure (i.e. organic dispersed in inorganic) of Tokito's invention.

Mori et al. (US 5,281,489) and Choong et al. (US 6,114,055) are of interest as demonstrating different multi-layered structures for EL devices known in the art at the time of the present invention. Mori et al. disclose a device having a mixture of components in the luminescent layer, and teach that the device may further comprise additional functional layers (e.g. see col. 28, line 63-col. 29, line 49). Choong et al disclose a device utilizing a combination of components present in a concentration gradient, and teach that the device may further comprise additional functional layers (e.g. see col. 2, line 9-col. 4, line 18).

11. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 7:00 a.m. to 3:30 p.m. Monday-Friday.

The current fax number for all official faxes is (571) 273-8300. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

/Marie R. Yamnitzky/  
Primary Examiner, Art Unit 1794

MRY  
March 17, 2008